Jun 7th, 12:00 AM

# Mendeley: Teaching Scholarly Communication and Collaboration through Social Networking

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# MENDELEY: TEACHING SCHOLARLY COMMUNICATION AND COLLBORATION THROUGH SOCIAL NETWORKING

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Abstract

Teaching Mendeley achieves the impossible – it gets users excited to learn about organizing and citing their research articles. However, introducing Mendeley to students and faculty goes well beyond assisting them with organizing their references. Students are particularly apt to see the benefits that its social networking features offer, including promoting collaboration, identifying key resources, and facilitating group work. There are benefits for librarians too - the information it provides on the use of articles can contribute to collection development or research into patterns of information as well as promoting librarian expertise.

As a free citation manager, Mendeley consists of two parts, a web interface that handles input – locating, gathering and tagging of citations and PDF's, and a desktop client that handles output through its integration with word processing tools. Mendeley users appreciate that it is compatible with almost all web browsers, and operating systems - there's even an "App" for it. Mendeley allows users to import citations and documents from a built in search engine, from most databases, including Google Scholar, or from other citation managers such as RefWorks and EndNote, to create in-text citations and bibliographies using virtually any style guide.

What really makes Mendeley stand out is the social networking it facilitates. Users can choose to open their collection of resources to the world or just to particular groups. It is also a powerful discovery tool, leading users to key resources, potential collaborators, and connections in their fields. Tracing the other people who have included a particular article in their collections, and seeing what else they've tagged leverages the knowledge of experts and colleagues in new ways.

The use of Mendeley can easily be included in workshops for faculty and information literacy sessions for students at all levels. Mendeley is free, user-friendly and effective; users are quick to see the benefits of time-saving, collaboration, and discovery Mendeley provides, extending the librarian's role from bibliographic instruction into finding resources in new ways, and organizing found information.

**Keywords:** Mendeley, citation software, scholarly communication, social networking, information literacy

## Introduction

Teaching researchers and students to use Mendeley opens their eyes to a world of possibilities. Users are quick to see the benefits of a tool that helps them manage the information overload characteristic of today's digital information environment, connect with other researchers, and make their workflow more efficient. The integrated set of tools that Mendeley provides brings together aspects of transparency from the Open Access movement, collaboration from Web 2.0 initiatives and resource discovery that integrates expert human filters with deep databases of content. And it does all this in a way that conserves the researcher's most precious resource, time, by reducing the inefficiencies of citation management and organizing or their information workflow. In fact, Mendeley enables the higher-level information literacy (IL) skills students and researchers need to succeed, and therefore has earned a place in IL instruction.

## What is Mendeley?

Mendeley is a free set of tools that assist users with resource discovery, collaboration, information management and citation. Mendeley was developed in 2007 in London and its name is derived from biologist Gregor Mendel and Chemist Dmitri Mendeleyev, (Hicks, 2010). At its simplest, it is a citation manager similar to EndNote, Refworks or Zotero, allowing users to gather and store citations from a variety of sources using several techniques, extract bibliographic information and format correct in-text citations and end-of-text references. However, Mendeley also functions as a powerful social networking tool that supports collaboration and resource discovery using Web 2.0 capabilities. With Mendeley, users can save papers for a group to consult, find other researchers investigating similar problems, and find new information through the resources that those researchers have discovered and tagged. The ability to track what other researchers have found on a subject introduces a powerful filter to the mass of information available to scholars. Those new to a research question can quickly identify key papers through the references archived or saved by researchers further along in their work who have chosen to make their lists public through public groups in Mendeley, offering a kind of arm's length, community mentoring that can also lead to closer collaboration. As more and more science research becomes collaborative, and as such collaborations are no longer bound by geographic proximity, tools like Mendeley have become essential to scholarly work, and therefore must become part of post-secondary education. Users are also free to use as many or as few of the Mendeley utilities that suit their work. While it supports the integration of searching, managing, integrating and citing information, these are not locked together, so users can develop their own effective workflows. As Mead and Berryman (2010) suggest, such customizability is highly prized as "it is easier to craft a tool that fits users' existing workflow than to teach them to change their workflow to fit the tool" (p. 393). A final advantage of Mendeley over many citation managers is that it is free and not bound by institutional subscriptions; it can safely store the researcher's prized information as that researcher moves from university to university and can continue to support lifelong learning beyond the academic environment.

## Citation management

Mendeley has two components, a desktop utility and a web-based storage space, which can be used independently or synchronized at the touch of a button. Mendeley web enables users to access content anywhere, anytime. Mendeley is compatible with Windows, Mac and Linux operating systems and can generate bibliographies in Microsoft Word, OpenOffice and LaTeX. It also has a free IPhone and IPad App. On the desktop, Mendeley allows drag-and-drop or manual entry entering of PDF`s or other documents into a user`s database, and works with word-processing software such as Word to assist in integrating citations into a paper, and developing reference lists in a variety of formats. On the web, Mendeley allows simple capture of web pages, journal articles, and other resources using a Web Importer

as the user finds them through Google, Google Scholar, proprietary databases or most online catalogues including WorldCat. For formats not entirely supported by the software, users can easily enter information manually. It is also relatively simple to import references from other citation managers such as Refworks, EndNote, Zotero and Papers. Mendeley provides a wide range of options for citation output, supporting up to 1200 individual styles, and functions across most web browsers. Like most citation tools, it cannot guarantee error-free output of references. Students and other users need to know citation formats well enough to catch and fix errors in capitalization, punctuation and formatting.

**Collaboration**

Mendeley supports collaboration in two ways, by allowing groups to share resources and by connecting researchers directly. While academic social networking may not have been widespread due to lack of time and a reluctance to share developing research (Zaugg, West, Tateishi & Randall, 2011), Mendeley seamlessly allows whoever a researcher invites to add and categorize resources to a collection, thereby supporting researchers working on joint or allied projects. It is easy to identify potential collaborators through papers saved in Mendeley, which also encourages users to set up profiles on the site to facilitate such connections. As (Zaugg et al., 2011) note, "This may help researchers begin conversations and collaborations with others interested in the same research" (p.33). Dr. Aled Edwards, Structural Biologist, University of Toronto, goes even further by stating in a recent Canadian Broadcasting Corporation radio interview that "there is no conflict between data-sharing and getting high profile publications, 'cause the more you share the more people contact you, the more ideas you have together, the larger academic network you have, the more knowledge you gain and the faster you can publish high quality science" (Interview Audio File, CBC Radio, January 29, 2012).

**Resource discovery**

The most powerful aspect of Mendeley however is resource discovery. As most journal publishers allow authors to link their own papers, many researchers, particularly in the sciences, are able to archive their articles in Mendeley. Users can search within the Mendeley database of papers added by the community of users. This database now stands at over 34 million papers. Search results indicate how many users have saved each paper, and the records for individual papers also show tags that users have applied to the paper that are in turn searchable. While users can't see the papers each individual author has collected, many groups have opened their reference lists to the public. For those wary of opening up their bibliographies to the world, it should be noted that the level of openness is entirely at the users' discretion. Resource lists can be open to public view, kept within the group, and these settings are specific to each document a researcher finds.

**Mendeley in comparison to other citation mangers**

There have been a number of studies comparing citation managers recently (Barsky, 2010; Gilmour & Cobus-Kuo, 2011; Zhang, 2012) all highlighting the respective strengths and weaknesses of each tool. In the comparison conducted by Gilmour et al. (2011), Mendeley had the highest cumulative score when compared to RefWorks, Zotero and CiteULike and offers unique features for the management of PDF's and advanced annotation features (Gilmour, 2011). All authors concluded that choosing a citation manager ultimately depends on user needs and workflow patterns. Disciplinary habits and preferred types of information sources, including specific journal citation styles will also influence the selection process. Furthermore some academics may be slow to embrace social networking because they are either busy, not convinced it will improve their productivity or may be reluctant to share their preliminary research findings (Zaugg et al. 2011).

## Research Metrics

The ability to tell how many collections a paper has been added to other libraries suggests other uses for Mendeley in terms of tracking the impact of particular works. (Li, Thelwall & Guistini, 2011) and (Priem, Piwowar & Hemminger, 2012) have investigated whether social citation or reference managers like Mendeley and Zotero have potential use as a way to measure scholarly influence. While their evidence was inconclusive they did highlight the correlation that exists between Mendeley and Web of Science citations and suggest that the number of times a paper has been read through resources like Mendeley may have potential research metrics potential, (Li, Thelwall, & Giustini, 2011). In a recent column in the Chronicle of Higher Education, Howard (2012) explained why alternatives for measuring scholarly impact such as social media based metrics or "Altmetrics", such as how often "research is tweeted, blogged or bookmarked" could some day complement established measures such as impact factor and h-Index metrics (Howard, para. 4). While research into altmetrics is still in its infancy more studies into the relationship between these social metrics, more established research and citation measures and career advancement are encouraged. On a broader scale, it is possible to search for users by their declared institution, and user profiles indicate activity related to publications. The software allows researchers to track the use of their own publications within the Mendeley user community (Medaille, 2010). The organization behind Mendeley is actively involved in developing other ways of using the data it now houses and collects, recently supporting an App contest. Active development of the software continues as the number of uses, users, and papers grows.

## Mendeley and Information Literacy Instruction

I first became interested in Mendeley as part of my work with senior undergraduate and graduate students in the life sciences. Several undergraduate and graduate students in Biology were using Mendeley and I was impressed with its capabilities. It was clear that these students were comfortable using the databases to find articles, but frequent complaints and questions around citing material led me to look for tools that might help. As I integrated Mendeley into second and third-year classes, the graduate students working as teaching assistants started asking for more information about it. This has led to open workshops focussing just on Mendeley. As a result of these workshops, I have seen students explore the possibilities of Mendeley for collaboration and resource discovery, integrating it into all aspects of their research processes. It has turned out that for graduate students, Mendeley helps solve quite a different problem than alleviating the tedium of citations. A common concern among this group is finding the high quality material among the glut of information now available. Often at the cutting edge of science, waiting for citations patterns to indicate quality or relevance puts researchers months or years behind. Mendeley acts as filtering tool as it allows students to see what other research groups are finding relevant and using while projects are in progress, well in advance of publication.

Mendeley supports many aspects of information literacy, from discovery, through evaluation to ethical use. It also supports the aims of transparency embodied in the open access movement by contributing to a more open sharing of resources, and a notion of impact that goes beyond citation counts. It also allows students to become contributors to collections of resources participate in the development of communities of knowledge and practice.

The response to Mendeley has been very positive. Recent student comments about it indicate they see many benefits from using the set of tools it provides:

**User Comments**

Comments from various users have been summarized in aggregate and include:

- Started using Mendeley as an undergraduate and learned that it would take care of in-text references and bibliography
- It really helps organizes my life as a student
- The “Import to Mendeley” icon does not work that well for me, could be due to publisher practices…
- I usually save PDF’s and Mendeley will automatically import any new manuscript into the correct folder
- Creating bibliographies a breeze especially the different journal styles that Mendeley supports but you do have to edit citations carefully especially page numbers and journal names which are often not capitalized correctly
- Love the free App from iTunes for my iPhone
- I have not used the collaboration features in Mendeley but they would be useful for group work
- Nothing better than hitting insert bibliography

Word of Mendeley has spread beyond the courses I work with, and I am now fielding requests from librarians and other faculty in disciplines from Education to Health Sciences.

**Benefits of Teaching Mendeley for Librarians**

Quite apart from being useful for the students I teach, Mendeley has also been useful in my own work. It has, for example, been part of my workflow in developing this paper. By using it myself, I have come to know its functionality and occasional quirks and can teach others more effectively. On a grander scale, by using Mendeley, and adding citations from the library literature, Librarians could broaden the readership of papers in our own fields and strengthen our cross-disciplinary contributions to research. And in turn, Mendeley is very useful in discovering research of benefit to our practice published outside of the library literature. It is interesting to see for instance what biologists are reading about information discovery, a feature of Mendeley searchers where the levels of interest in particular papers from people in broad disciplinary categories is part of the item display.

Mendeley has also provided a way to start conversations with other faculty. Tools that save time are always of interest, and a tool that not helps them conduct research, but to trace the impact of their own work has captured their attention. Developing expertise with tools like Mendeley may be another of demonstrating our relevance as researchers and students seek assistance with their information management needs. I am aware of some research groups in Mendeley that include a librarian, indicating another potential benefit in developing stronger partnerships between librarians and other faculty.

Mendeley also has the potential to aid in collection development, by alerting librarians to high-use publications and providing a different means of assessing which publications are high-impact. The work of faculty researchers is also often available through Mendeley and through the bibliographies and references listed, librarians can track the impact of their collections on faculty work.

## Teaching Mendeley

The use of Mendeley can be taught within IL classes for specific courses, or as a stand-alone workshop. It is very useful in these situations to have at least one other person familiar with Mendeley available to assist students in setting up the online account, desktop components and installing program plugins. This dual aspect of Mendeley is often challenging to first-time users, but once the setups are complete, students have little difficulty adding and managing papers. In practice, I have mentioned Mendeley briefly as part of a class, then worked with interested students individually to help them install the desktop component on their personal computers and get started adding references. These consultations take less than 15 minutes as students quickly grasp the main aspects of Mendeley and see how to integrate it into their workflow.

There are a number of guides to using Mendeley available on the web that supplement the helpful video tutorials on the site itself, and it's worth reviewing these before creating your own guides.

Before embarking on integrating Mendeley into your IL practice, there are a number of factors to think about.

### Are the features of Mendeley a good fit for your users?

Some disciplines have more active and open representation than others within Mendeley – it may be of more benefit in genetics or physics than archaeology or literature, but as the user population is increasing and broadening, this is subject to change. For example, if most of your instruction is aimed at first and second year students, Mendeley may be more than they need for the assignments they have, and students may not see the value in learning the software. It could be argued that first year students are better off learning how to use a prescribed Style Guide(s) before using a reference software tool such as Mendeley. (Childress, 2011) suggests that "without a basic understanding of formats and citation styles, students using citation managers and generators are more likely to submit improperly formatted citations and bibliographies" (p. 146). Some users are less willing to share their references on the open web – however as the user has complete control over privacy settings this may affect the kind of use rather than the amount of use faculty and students will make of Mendeley. Also, users with more experience in citing materials will be better prepared to correct Mendeley's output as needed. As with all citation managers, Mendeley's output is only as good as the input and there are some details of citation production that Mendeley and other free packages such as Zotero struggles with, including journal title abbreviations, capitalization of article titles and how many authors should be listed (Gilmour & Cobus-Kuo, 2011). URLs with proxy prefixes, capitalization and less common resource types such as conference proceedings and patents can also be problematic.

### Developing Expertise

Can library staff become expert with yet one other reference management program and offer Mendeley support and training? Promotion of these resources creates expectations among users that library staff will be able to offer assistance with Mendeley and all the features these tools offer. While libraries continue to support and provide training for traditional bibliographic citation programs like EndNote and RefWorks the introduction of free, Web 2.0 based academic social networking resources like Mendeley and Zotero will make it difficult for libraries to not offer support and training. Childress (2011) posits that "these tools are fast becoming research standards and libraries will likely see even larger numbers of researchers looking toward the library to support not just their citation management needs, but their broader personal information management needs as well" (p.150).

Depending on the IT environment at your institution, teaching classes in Mendeley can be technically problematic. If students bring their own laptops to classes, the installation of desktop software to synchronize with online accounts is relatively simple. If the computers your students will use are desktops with pre-set capabilities and security blocks on downloading software, teaching Mendeley becomes more difficult and may require assistance from the IT department to enable you to teach the classes. At the Authors institution an installation script was created on a network drive so that staff could easily download the Mendeley Desktop client prior to any instruction session on campus. As noted above, it is useful to have additional assistance available in classes to get students set up with online and desktop Mendeley accounts and to do some potential troubleshooting. Budgetary constraints may prevent some libraries from subscribing to tools like EndNote and Refworks so Mendeley may fill such a void.

**Conclusion**

The set of tools Mendeley provides enables advanced information literacy skills by focussing the users attention and time in locating and organizing information rather than on the minutiae of citation. For both students and experienced researchers it can offer efficiencies that save time and reduce duplication of effort. The combination of desktop and web access, and the App developed for mobile devices allows the user anytime/anywhere access to the resources they have collected, supporting a variety of personal workflow preferences. Mendeley's social networking aspects also suits current and emerging work practices, facilitating collaboration among researchers who know each other through the private groups function and more open sharing of information through public groups and resource lists. The profiles in Mendeley also support this social dynamic, helping users to find like-minded researchers. The profiles also allow researchers to trace the Mendeley activity related to their own work, offering a different kind of impact information. Researchers can gather their materials securely in Mendeley without fear of losing access if they change institutions, or leave academe altogether, a very useful feature in this era of rapid change in postsecondary institutions.

Increasingly, researchers must learn to curate their own materials. Library collections have gone well past the days of well chosen, individually evaluated books and journals and the mass of information available to researchers and students can be daunting. Mendeley offers a way for individuals to regain some control, to impose their own categories and tags, to save materials to a library of their own that is not bound by geography and is available 24/7 at the click of a button. Librarians may even have a role in helping users think about tags and classifications to work more efficiently with these personal collections.

For librarians, besides being a powerful tool for their own research, Mendeley serves as another point of engagement with other faculty and students. Developing fluencies and expertise with resources like Mendeley we may be better able to make connections in senior classes, offering something besides bibliographic searching; it may be a way to work with research teams on campus; it may offer a different perspective on the how well the library's collections match the needs of the institutions' researchers, or the impact of researchers' work. In any case it is another way for the library to add value to the institution.

Finally, for students, the importance of understanding what Mendeley is and how it can work for them will only increase as the database grows. Increasingly Google searches turn up documents in Mendeley, an indication of the reach and depth of the database. Students who aren't aware of it or don't know how to search it risk missing key papers and emerging patterns in research.

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